SPOROCYSTS IN AN ANNELID.[1]

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In the summer of 1910, while at work at the United States Fisheries Biological Station, Woods Hole, Mass., I was told by Dr. Gilman A. Drew that what were supposed to be cercariæ had been noticed at different times associated with the annelid *Hydroides dianthus* Verrill among material being used for study at the Marine Biological Laboratory.

Acting upon this suggestion I examined a large number of these serpulids on several dates in August of that year. Although much of the material was examined very minutely, the worms having been removed from the tubes, teased, and everything that even remotely resembled a sporocyst further examined, neither sporocysts nor cercariæ were found.

In the following summer I secured two lots of these sporocysts from this annelid. For the first lot, July 15, I am indebted to Dr. Drew, and for the second, July 21, to Miss Margaret Morris.

In each case the single annelid was lying in a dish of sea water, and in the bottom of the dish there were a large number of sporocysts. These sporocysts were found to contain cercariæ in various stages of development but no rediæ. As they lay free in the sea water the sporocysts were for the most part white, or bluish translucent white. In some of them there were varying amounts of orange pigment of similar appearance to the abundant pigment in the annelid. They were short and thick, bluntly rounded at the ends, and more or less arcuate. In some cases they were curved until the ends almost touched each other. Many of the second lot were orange yellow, also many of them were actively contractile. A frequent change of shape was that from the characteristic short, blunt-pointed sub-cylindrical form to a fusiform shape with elongated and slender-pointed

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ends. In this condition they were sometimes straight and sometimes arcuate (Fig. 1). In each sporocyst there were tailed cer-

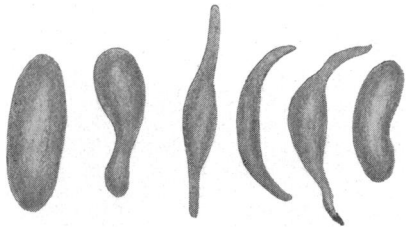

FIG. 1. Contraction shapes of sporocysts, life.

cariæ along with various stages of developing cercariæ, from globular balls of cells, 0.04 millimeter in diameter, to cercariæ, 0.5 millimeter or more in length (Fig. 2). The anterior portion

FIG. 2. Sporocyst showing cercariæ in different stages of development. Cam era lucida sketch of stained and mounted specimen. Actual length 1.04 millimeter.

of these cercariæ is sub-cylindrical and slightly tapering at the anterior end. It is marked off from the elongated tail portion by a constriction, which, in the mature cercariæ, is at about the anterior fourth of the entire length. In other words, the tail, which is forked at the end, is about three times the length of the body. Along the dorsal aspect of the body in a few instances a longitudinal row of exceedingly slender spines was noted. As this cercaria resembled very closely a cercaria which I have found in the scallop (*Pecten irradians*), I recorded in my notes that it was likely that these spines, as in the cercaria from the scallop, are remnants of a fin-like membrane, and that the type represented by this cercaria is evidently near that of *Cercaria cri tata* Le Val.

On July 19, 1914, through the kindness of Dr. E. J. Lund, I had the opportunity of examining another lot of these cercariæ from this same annelid. Some of these were observed to be covered with an exceedingly thin hyaline membrane which becomes constricted at frequent intervals, the constrictions ultimately being the only part of the membrane that is visible. The cercariæ from *Hydroides*, as was the case with those from the scallop, exhibit great activity, but the nature of their movement is different. Instead of a characteristic pecking motion of the anterior end, the cercariæ from the annelid, occasionally, after lying motionless for a time, perform exceedingly rapid wriggling movements. The anterior end of the body is provided with a short, retractile boring apparatus, shown protruded in Fig. 3.

In addition to the various stages of developing cercariæ, other structures were observed in these sporocysts. With transmitted light these appeared to be granular, but with reflected light, or, with high magnification, they appear to consist of minute oil droplets, at least in part. In some cases they were distributed rather uniformly near the surface, in others they were massed in the central region.

The number of these sporocysts is very great. In the first lot it was estimated that there were between 900 and 1,000 sporocysts in the dish with the annelid. After the worm had been lying for a few minutes in a dish of clean sea water to which it had been transferred, a number, 25 or more, of sporocysts made their appearance on the bottom of the dish. The worm was then

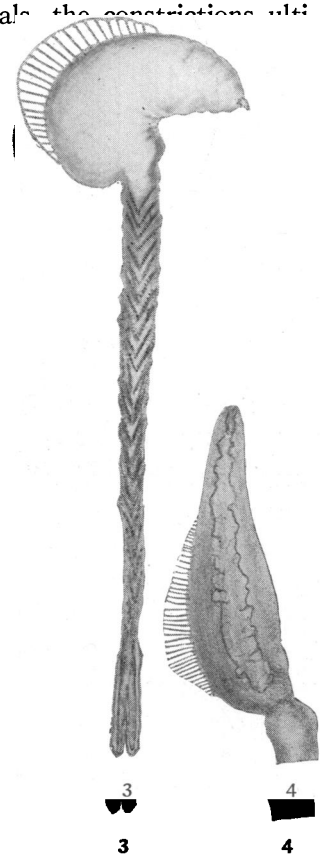

FIG. 3. Cercaria with fin-like crest. The thin investing membrane is indicated at the posterior end. Length of body 0.17 millimeter, length of tail, 0.52.

FIG. 4. Anterior end of a cercaria with a crest of slender, cilia-like spines.

placed in corrosive-acetic and afterwards sectioned. The sections show an immense number of sporocysts (Fig. 5). For the most

FIG. 5. Transverse section of *Hydroides dianthus* showing sporocysts embedded in the body wall. *a*, intestine.

part they are distributed ventrally in the inner portion of the body wall, although a few lay among the muscles near the exterior, and a few in the epidermis. If I interpret the sections correctly, the sporocysts escape from the ventral side of the serpulid, where the body wall is comparatively thin, and where the sporocysts are in greatest numbers.

There is considerable variation in the size of the sporocysts. The largest noted was 0.70 millimeter in length and 0.28 millimeter in diameter; the smallest 0.17 in length and 0.10 in diameter. In like manner the cercariæ varied in length, but the length of 0.12 millimeter for the anterior portion, and 0.36 for the tail, or 0.48 millimeter for the whole length, is not far from the usual length of a mature cercaria. One cercaria, living, had the following dimensions: Length of body 0.17 millimeter, breadth 0.04; length of tail 0.52, breadth 0.02.

What were interpreted to be striated muscle fibers were noticed in the tails of living cercariæ (Fig. 3). These fibers extend diagonally backward and inward from the exterior to the median line. They were about 0.0017 millimeter in diameter, and what appeared to be cross striations were plainly visible with a Zeiss D objective. Under an oil immersion lens their resemblance to striated muscle was evident.